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Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claims 1 - 25 (canceled):

Claim 26 (new): A photon-counting imaging device for single x-ray counting comprising:

- a) a layer of photosensitive material;
- b) a source of bias potential;
- c) a source of a threshold voltage supply;
- d) an NxM array of photodetector diodes formed using said layer of photosensitive material, each of said photodetector diodes having a bias potential interface and a diode output interface, said bias potential interface of each photodetector diode being connected to said bias potential;
- e) an NxM array of high gain, low noise readout unit cells, one readout unit cell for each photodetector diode;
- f) each readout unit cell including:

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an input interface connected to said diode output interface;

a high-gain voltage amplifying unit including a comparator unit; and

a digital counter unit including a digital counter and a digital counter output interface connected in series, each digital counter unit counting an output signal of the comparator unit, said output signal being proportional to a number of electron/hole pairs generated by a photon in the respective photodetector diode;

g) a multiplexing unit including a row select and a column select circuit allowing to access each readout cell unit, to read out the digital data as actually stored in the digital counter to the digital counter output interface;

h) each digital counter output interface connected to an output bus; and

i) said output bus being connected to a data processing unit controlling the multiplexing unit.

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Claim 27 (new): The photon-counting imaging device according to claim 26, wherein the diode output interface of the photodetector diodes and the input interface of the readout unit cell are connected to each other by bump bonding.

Claim 28 (new): The photon-counting imaging device according to claim 27, wherein indium bumps are used for the bump bonding.

Claim 29 (new): The photon-counting imaging device according to claim 26, wherein the data processing unit are provided being connected via the multiplexer unit to said array of readout unit cells allowing to control each of the readout unit cells.

Claim 30 (new): The photon-counting imaging device according to claim 29, wherein said data processing unit controls a enable/disable switch being comprised in the comparator unit of said high gain voltage amplifying unit.

Claim 31 (new): The photon-counting imaging device according to claim 26, wherein said source of a threshold voltage supply to said high gain voltage amplifying unit comprises an adjustable source of threshold voltage correction supply, both

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being controlled by the data processing unit via the multiplexer unit.

Claim 32 (new): The photon-counting imaging device according to claim 26, wherein the data processing unit controls, via the multiplexing unit, one or more of the following issues:

- 1) programming of the readout unit cell via a port;
- 2) readout of the data in the readout unit cell via a port;
- 3) calibration of the readout unit cell, preferably the high gain voltage amplifier unit, via a port; and
- 4) analyzing the analog signal in the high gain voltage amplifier unit for the purpose of diagnosis via a port.

Claim 33 (new): The photon-counting imaging device according to claim 26, wherein said NxM array of photodetector diodes, said NxM array of said readout unit cells being arranged on a first substantially flat support plate for building a sensor module, and a sensor module control board being arranged on a second substantially flat support plate, said first substantially flat support plate and said second substantially

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flat support plate being arranged under an angle to each other.

Claim 34 (new): The photon-counting imaging device according to claim 33, wherein said angle is in a range of 30 to 120.

Claim 35 (new): The photon-counting imaging device according to claim 34, wherein a number of said sensor modules being arranged in a substantially flat VxW array.

Claim 36 (new): A photon-counting imaging device for single x-ray counting comprising:

- a) a layer of photosensitive material;
- b) a source of bias potential;
- c) a source of a threshold voltage supply;
- d) an NxM array of photodetector diodes formed using said layer of photosensitive material, each of said photodetector diodes having a bias potential interface and a diode output interface, said bias potential interface of each photodetector diode being connected to said bias potential;

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e) an NxM array of high gain, low noise readout unit cells, one readout unit cell for each photodetector diode being controlled by a data processing unit;

f) each readout unit cell including:

an input interface connected to said diode output interface;

a high-gain voltage amplifying unit including a comparator unit;

a digital counter unit, including a digital counter and a digital counter output interface connected in series, each digital counter unit counting an output signal of the comparator unit, said output signal being proportional to a number of electron hole pairs generated by a photon in the respective photodetector diode; and

g) the array of photodetector diodes is designed as a microstrip detector having $N=1$ columns and $10 < M < 10^5$ rows.

Claim 37 (new): The photon-counting imaging device according to claim 36, wherein said rows having a width of about 5 to 50

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μm , a length of about 0.5 to 50 μm , and a pitch of about 10 to 100 μm .

Claim 38(new): The photon-counting imaging device according to claim 37, wherein said rows have a width of about 10 to 20 μm , a length of about 5 to 10 μm , and a pitch of about 25 to 75 μm .

Claim 39 (new): The photon-counting imaging device according to claim 36, wherein said source of a threshold voltage supply to said high gain voltage amplifying unit comprises an adjustable source of threshold voltage correction supply, both being controlled by the data processing unit.

Claim 40 (new): The photon-counting imaging device according to claim 36, wherein said data processing unit provide unit for enhancing the position resolution of an incident photon, said unit for enhancing the position resolution comprising a comparator unit comparing the signals of two adjacent photodetector diodes.

Claim 41 (new): The photon-counting imaging device according to claim 36, wherein the data processing unit allow to determine an average amplitude for the gain of the electron hole pairs generated by an incident photon and to set a

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threshold voltage corresponding to less than half of the average amplitude, said data processing unit evaluate coincident output signals in adjacent readout unit cells in order to disable the counting in the adjacent readout unit cells having delivered the lower output signals.

Claim 42 (new): The photon counting imaging device according to claim 36, wherein the data processing unit allow to determine an average amplitude for the gain of the electron hole pairs generated by an incident x-ray photon and to set a threshold voltage corresponding to less than half of the average amplitude, the data processing unit generate a virtual intermediate photodetector diode between two adjacent photodetector diodes; and an incident photon is assigned to said virtual intermediate photodetector diode in case the output signals in two readout unit cells assigned to adjacent photodetector diodes exceed said threshold voltage.

Claim 43 (new): The photon-counting imaging device according to claim 36, wherein the data processing unit controls one or more of the following issues:

- 1) programming of the readout unit cell via a port;
- 2) readout of the data in the readout unit cell via a port;

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3) calibration of the readout unit cell, preferably the high gain voltage amplifier unit, via a port, and

4) analyzing the analog signal in the high gain voltage amplifier unit for the purpose of diagnosis via a port.

Claim 44 (new): A photon counting imaging device for single x-ray counting comprising:

a) a layer of photosensitive material;

b) an NxM array of photodetector diodes formed using said layer of said photosensitive material;

c) an NxM array of high gain, low noise readout unit cells, one readout unit cell for each photodetector diode, the readout unit cells being controlled by a data processing unit;

d) each readout unit cell including an internal data processing unit allowing to assign each output signal representing an incident photon or a predetermined number of incident photons in the corresponding photodetector diode to a preselectable region of interest; and

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e) said assignment of the output signal is accompanied by a time stamp.

Claim 45 (new): The photon counting imaging device according to claim 44, wherein each readout unit cell further comprises an input interface connected to said diode output interface, a high-gain voltage amplifying unit including a comparator unit, a digital counter unit, including a digital counter, and a digital counter output interface connected in series, each digital counter unit counting the output signal of the comparator unit, and said output signal is additionally directed to a region of interest unit, said region of interest unit being part of the readout unit cell or being part of the external data processing unit.

Claim 46 (new): The photon-counting imaging device according to claim 44, wherein at least one predeterminable region of interest is comprised, whereby a preselectable number of elected photodetector diodes build this region of interest; the output signal in each elected corresponding readout cell unit being processed to a region of interest unit causing the output interface, corresponding to the region of interest hit by an incident photon to set a region of interest hit signal, said region of interest hit signal is aligned by the time stamp originated by an external or an internal clock unit.

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Claim 47 (new): The photon-counting imaging device according to claim 46, wherein the data processing unit provides a unit for storing either the time stamp or information including the time stamp and the corresponding regions of interest which was hit by an incident photon originally causing the output signal.

Claim 48 (new): The photon-counting imaging device according to claim 46, wherein the region of interest unit comprises a counter unit for which a threshold for setting a region of interest hit signal is determinable.

Claim 49 (new): The photon-counting imaging device according to claim 46, wherein the external or the internal clock unit are resetable and operates with a frequency in the range of 10 to 500 MHz.

Claim 50 (new): The photon-counting imaging device according to claim 49, wherein the range is about 100 MHz.

Claim 51 (new): The photon-counting imaging device according to claim 44, wherein a number of at least two regions of interest are provided, each of the at least two regions of interest having a programmable time-related validity.